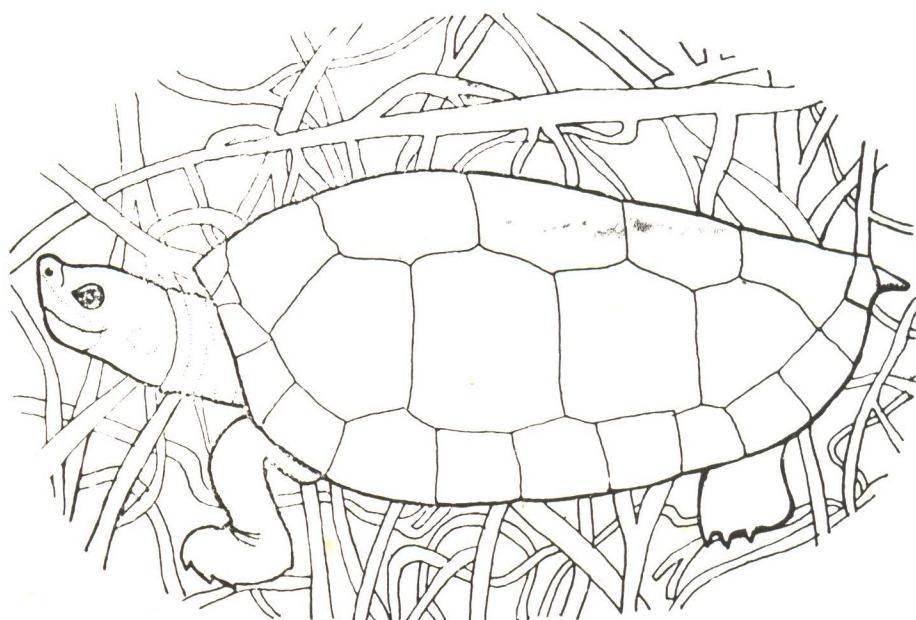


HAMADRYAD

No: 1

JULY 1989



THE RIVER TERRAPIN (Batagur baska)

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H A M A D R Y A D

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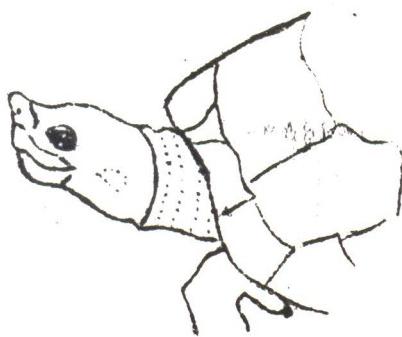
July 1989

NEWS FROM THE MADRAS CROCODILE BANK

1. Dr. Peter C.H. Pritchard of the Florida Audobon Society, and author of the bestsellers 'Encyclopedia of turtles' and 'Turtles of Venezuela' was in India recently, on his filming project, 'Turtles of the world'. Part of his activities, while in south India, were based at the Croc Bank, where he and his crew filmed such rarities as *Melanochelys tricarinata*, *Batagur baska* and *Geoclemys hamiltonii*.
2. Croc Bank Biologist, Indraneil Das, has been awarded an Inlaks Foundation Scholarship and an Overseas Research Student Award to do a thesis (naturally on Indian herps) at the Animal Ecology Research Group, University of Oxford. Dr. Grenville Lucas, Chairman, Species Survival Commission, has nominated Indraneil and Sushil K. Dutta of the Orissa University of Agricultural & Technology Sciences, Co-chairmen of the IUCN/SSC Indian Subcontinent Reptile and Amphibian Specialist Group.
3. Eco Media's film "Seeds of Hope", a 23 min. 16mm colour documentary, produced and directed by Rom Whitaker and Shekar Dattatri for SIDA, has won an award at the 36th National Film Festival, 1989.
4. A long awaited event took place in April this year, when the gharials finally decided to nest at the Croc Bank. This completes the Bank's achievements with regard to the successful breeding of the three Indian species of crocodilians.
5. The Croc Bank received a grant of \$10,000 from the Wildlife Preservation Trust International, U.S.A., to develop the turtle breeding and research programme here on the endangered Indian turtles and tortoises. This is mainly due to the efforts of Dr. Bill Konstant, who our Curator, Harry Andrews met briefly in the U.S. last year and informed of the need to make larger enclosures for the turtles at the Croc Bank to step up the breeding and display facilities. The WPTI had earlier made a grant of \$7500 in 1983 to the Croc Bank with which large breeding enclosures for several of the freshwater, and land species were constructed. Currently most of the nesting takes place in these enclosures.

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BATAGUR BASKA IN ORISSA

Indraneil Das, Biologist, Madras Crocodile Bank

Annandale (1912), in his account of the turtles of the Mahanadi drainage, suspected the occurrence of Batagur baska in the river. Subsequently, however, no examples of the species, which is largely restricted to mangrove dominated deltaic regions of rivers, were found, and with the development of Paradip Port near the mouth of the Mahanadi, now a large industrial township, the last of the mangrove tracts in the river disappeared.

J. Vijaya, the late Research Assistant of the Madras Crocodile Bank Trust, heard descriptions of the species from fishermen at Udaipur village, near Digha on the Orissa - West Bengal border (Vijaya 1982 and unpublished notes). Udaipur is on the banks of the Subarnarekha river, where Moll and Vijaya (1986) also found the little-known softshell turtle *Pelochelys bibroni*. In her letter from the field, Vijaya wrote of nesting by Batagur baska in the islands off the Subarnarekha river mouth, based on information she received from the locals, who called the species 'Ram kachim'.

In February, 1984, while on a field trip to Gahirmatha, Bhitar Kanika Wildlife Sanctuary, Orissa, I had an unconfirmed sighting of what I believe to be Batagur baska - a small, dark-coloured, smooth-shelled emydid, near the river mouth close to Ekkakula. No observations on this were published, since the species could not be collected or photographed, and equally important, the species was not reported by the half a dozen capable biologists who worked on the ridleys of Gahirmatha, though fishermen in the West Bengal Sunderbans, during my survey of Batagur claimed to have collected its very distinctive eggs, along with those of the ridleys, from the Gahirmatha coast before the area was gazetted a Wildlife Sanctuary in 1975.

My own interest on the occurrence of Batagur baska in Orissa was rekindled recently, on discovering a letter dated 9th April, 1982, from Chandra Sekhar Kar, (then doctoral student of Utkal University) to Vijaya. Kar spent some 8 years at Gahirmatha, studying the ridleys. In the letter, he wrote of Batagur nesting in the area, but 'in lesser numbers than ridleys'!!

These records indicate that *Batagur baska* may well be extant in the mangrove-backed coast of north-eastern Orissa, and nesting, at least up to the recent past, did take place. Records from Orissa also mean an extension of range of *Batagur baska* by a few hundred kilometres to the west of the Sunderbans, where the species is known to nest at a number of islands, shown elsewhere (Das 1987).

Literature accounts from the last century make it clear that the species was once abundant, and almost certainly ranged further north. The Zoological Survey of India, Calcutta, has an example from (Saltwater Lake, Calcutta) the northern-most record which is supported by a museum specimen. Mangroves were known to dominate the Salt Lake Area of Calcutta up to the end of the last century, before the tidal channels were closed. The report of the species from Sarnath, Uttar Pradesh, mentioned by Nath (1959) is untenable, the locality being hundreds of kilometres upriver from the sea-mouth and the mangrove habitat of *Batagur baska*.

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REPORT ON THE CHELONIANS OF GIR WILDLIFE SANCTUARY

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Heredia, Costa Rica, C.A.

As part of an Indo-American Subcommission project on the Biology and Conservation of Indian Turtles and Tortoises (approved and sponsored by the Government of India), short studies were made in several places in Saurashtra, after consultation with Forest Department officials and the Wildlife Institute of India.

Summary of findings

Two species of chelonians have been documented in the Sanctuary: the Indian flapshell turtle (*Lissemys punctata*), and the star tortoise (*Geochelone elegans*). Recent findings from Saurashtra prove that the Indian softshell turtle (*Trionyx gangeticus*) is in this region, and it is suspected to occur in the larger water bodies of Gir.

The flap shell turtle is common in standing water and found in both eastern and western Gir. A pool about 20 m x 20 m by the road at Devadanagar has at least 6 individuals. There are reports from other places (Ravi Chellam, pers. comm.) and the species is said to be common at Baneg (B.C. Choudhury, pers. comm.).

The star tortoise is likewise widely distributed. In eastern Gir there are reports from Timberya (1 large animal) and near Sarakabia (2 small animals) (A.K. Sharma, pers. comm.), and from Baneg (U. Vora, pers. comm.) A semi-captive tortoise is said to roam the compound of the Crocodile Breeding Centre in Sasan. One of the most interesting sightings was of a female nesting at Chodia, western Gir, in late July 1985, near teak forest on the bank of the river (B.R. Pandya, pers. comm.).

Tortoise sightings by Ravi Chellam in Gir Wildlife Sanctuary have been made in the deciduous teak forest. These include areas of various types of vegetation: 1) mature forest dominated by *Tectona grandis* and *Acacia senegalensis* with a maximum canopy at about 25 m; a relatively open understory dominated by *Ziziphus mauritiana* with a canopy at about 10 m, and dense (virtually 100%) cover by high grass; 2) grassy roadside through mature forest dominated by *Tectona grandis* with a dense woody understory and poor grass cover; 3) open woodland on a hilltop (with an estimated altitude of 200 m) littered with basaltic boulders, with a canopy at about 10 m of mixed species such as *Tectona grandis*, *Terminalia paniculata* and *Diospyros melanoxylon*; a sparse open understory and grass; 4) dense scrubby woodland transitional between *Tectona grandis* forest and poorly developed riparian forest along a narrow stream bed; 5) open gentle slope of grasses and herbaceous annuals in the midst of dense *Acacia nilotica* woodlands, at the edge of a reservoir. Hence, most of the forest types listed for the western side of Gir Wildlife Sanctuary by Hodd and Hodd (1982) appear to be used by tortoises.

A dead female specimen (JGF 5149) was found at site number 4 above. Two dead male specimens (JGF 5151 and JGF 5152) were in the Crocodile Breeding Centre; one is said to have come from the Sasan area and one from the Sanctuary.

The two male specimens, measuring 26.2 and 25.3 cm in curved carapace length, are normal for the species in western India in regard to size and scalation. JGF 5151 has an unusual condition of 3 incisions in the left side of the supracaudal peripheral bone. The female, measuring 38.0 cm curved carapace length, is large but normal in measurements and scalation. The growth rings on her ishial spurs are remarkable.

Recommendations

Because sightings of chelonians in Gir by reliable people are rare, it is important to document as much as possible from each sighting: date, exact locality, habitat type, type of day, activity of the animal, and if possible, body weight and curved carapace length. Of particular importance are records of mating, nesting, hatching and predation.

Very little is known of the habitat requirements or general biology of the star tortoise, and it is therefore strongly recommended that no habitat manipulation be undertaken until thorough studies be carried out. Fires must be controlled, and even fire-line fires must be carefully watched to prevent tortoises (and other small animals) from being burned alive. Water sources must be left approachable to tortoises, and not delimited with steep cement or rock sides.

References

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REPORT ON THE STAR TORTOISES IN THE SAKKARBAGH ZOO, JUNAGADH

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A preliminary visit was made to the Zoo on 22nd January 1987 and after consultations with Mr. B.R. Pandya, Assistant Conservator of Forests, we travelled to Junagadh on 1st February 1987 to measure the adult tortoises in the Sakkarbagh Zoo. More than 60 measurements and observations were made, and 3 photographs taken, for each of the 23 adults. The zoo veterinarian and his assistant were shown how to determine the sex of the star tortoise. In addition, each animal was given a permanent mark to facilitate record keeping by the zoo staff. The major measurements and marking scheme are given in the following table.

Summary of findings

Males

The nine males examined were all within the normal size range; none were over 3.3 kgs or more than 34.7 cm in curved carapace length. With the exception of JGF 5161, they all show the typical secondary sexual characteristics of the male of the

species: elongate shape to shell; convex supracaudal scale; deeply concave plastron; constricted postanal gap; and long tail.

JGF 5160 is remarkable in that the posterior of the carapace is totally scar tissue; the anterior two-thirds has dead bone and scar issue. This individual shows the incredible survival ability of the tortoise, for its entire outer shell - consisting of keratinous scales covering interlocking bones - has been destroyed and even removed. JGF 5161 was sexed only after it everted the penis; this animal is abnormal in growth with the carapace scales (normal in number growing in a pyramidal manner - rather than as parts of the surface of a hemisphere).

Females

The fourteen females examined are all within the normal size range of the species; JGF 5176, which weighed 6.5 kgs and was 41.7 cm in curved carapace length, is the second largest animal observed out of a total of 129 specimens examined from eastern India. All females showed secondary sexual characteristics typical of the species: round shape to shell (most notable when viewed from above); flat and oblique supracaudal scale; flat (or only slightly concave) plastron; large postanal gap; and short tail.

JGF 5175 has none of the original keratin, but is totally covered with scar tissue; it is likely that this animal had been caught in a bush fire, and luckily survived. Three females were marked (painted) as having nested within the compound: JGF 5172 on 12th August 1986; JGF 5171 on 15th August 1986; and JGF 5173 on 7th October 1986. The only animal in the collection for which specific locality data are available is JGF 5165.

General condition of adults

In general, the animals are active and appear to be in good health. The fact that at least 3 females nested during the last season, is a good indicator that these tortoises are in good condition.

Hatchlings

It was not possible to examine the hatchlings. However, the rearing conditions in their cage did not include adequate water or shelter.

Recommendations

Adults

The ad lib supply of water and lucerne provides critical requisites to the tortoises, and the large areas with direct

sunlight and deep shade, are very valuable to the thermoregulation and activity of the animals. There is adequate food, water and area for the present herd.

A captive herd of 9 males and 14 females is large enough to develop an effective breeding programme. It is recommended that additional animals should not be actively sought, for the herd is now very large, and too many males may increase antagonistic interactions during the breeding season.

Better shelter could be proved by planting a few indigenous *Ziziphus* shrubs at the edges of the compound for the tortoises to hide under. There are enough tortoises that some individuals would always be active and visible to the public.

The muddy pond in the west centre of the enclosure provides adequate water for drinking, and this should be maintained.

Nutritional requirements could be enhanced - particularly during the mating and nesting seasons - by providing high protein plant food (e.g. legumes) and sources of digestible calcium.

It is most important that detailed records be kept of animals, e.g. mating, nesting, and unusual behaviours and activities. The permanent marks cut into the marginals (invisible to the public) will assist in record keeping.

Hatchlings

The hatchlings enclosure should be provided with:

1. Rat-proof quarters (rats eat hatchlings).
2. Sufficient water in shallow puddles which the animal can enter at any time for drinking.
3. Plant food rich in digestible proteins and calcium, and a mixture of plant foods red or orange in colour (e.g. chopped tomatoes and finely grated carrots) should be provided every morning.
4. Shelter, consisting of small overhangs (ideally of shrubby vegetation) under which animals can take refuge, should be provided.
5. Areas both illuminated directly by the sun and also deeply shaded from the sun should be available.
6. Monthly growth records of individual tortoises hatched at the Zoo. Individuals could be marked with serial numbers painted on the plastron with commercial available nail polish.

Summary of measurements on adult star tortoises

in the Sakkarbagh Zoo

JGF No.	Sex	Carapace Curved (cm)	Length Straight (cm)	Weight (kg)	Marginal scale(s) marked
5155	male	34.7	25.7	3.300	1st right
5156	"	33.4	24.8	2.800	2nd "
5157	"	34.2	24.9	3.200	3rd "
5158	"	33.6	25.1	3.100	8th "
5159	"	31.5	22.5	2.300	9th "
5160	"	@ 31.1	@ 23.7	2.750	see text
5161	"	21.9	16.5	1.200	see text
5162	"	23.6	18.0	1.600	10th right
5163	female	37.1	29.0	4.800	1st left
5164	"	37.2	28.4	4.700	2nd "
5165	"	37.0	28.3	4.300	3rd "
5166	"	34.9	26.8	4.300	8th "
5167	"	39.9	29.0	5.300	9th "
5168	"	36.5	27.6	4.700	10th "
5169	"	38.0	30.3	4.900	11th "
5170	"	38.6	28.4	4.800	1st & 12th left
5171	"	36.8	29.0	4.900	2nd & " "
5172	"	38.6	30.6	5.300	3rd & " "
5173	"	37.0	28.5	4.600	8th & " "
5174	"	37.8	28.6	4.600	9th & " "
5175	"	@ 34.0	@ 27.5	4.200	see text
5176	"	41.7	32.2	6.500	10th & 12th left
5177	male	31.8	23.3	2.600	11th right

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ECTOPARASITES OF TURTLES FROM SOUTH INDIA

Indraneil Das, Biologist, Madras Crocodile Bank

I am working on the infestation rates of ectoparasites (mainly leeches and ticks) of several species of Indian turtles. The following data summarised in Table 1, apparently represent records in terms of infestation rates for 2 species. More details, including identification of the parasites and their possible effect on reproductive - and physiological - fitness will be presented in future publications.

TABLE 1

Parasite Type	Number	Host & Sex	Locality	Site	Habitat/ date collected
Leech	231	<i>Lissemys punctata</i> (female)	Thiruvidenthai, Chingleput District, Tamil Nadu	Carapace plastron, cloaca	Pond 3.10.88
Tick	3	<i>Geochelone elegans</i> (female)	Sitanavassar, Pudukkottai District, Tamil Nadu	Axillary region	Scrubland 25.3.89
Tick	1	<i>Melonchelys trijuga</i> (male)	Chichali, Indira Gandhi Wildlife Sanctuary, ** Coimbatore District, Tamil Nadu	Carapace	Dry stream bed 27.3.89
Tick	29	<i>Indotestudo forstenii</i> (female)	-do-	Fore and hind limbs, inguinal region	-do-

** Formerly, Annamalai Wildlife Sanctuary.

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KADARS - PEOPLE OF THE FOREST

J. Vijaya (undated)

J. Vijaya, the late Research Assistant of the Madras Crocodile Bank rediscovered the forest cane turtle, *Geoemyda silvatica* (*Heosemys silvatica* in the following note) after an interval of nearly 70 years, 1982. Subsequently, she spent 6 months in the Kerala forest, living in a cave to study the ecology of this poorly-known forest-dwelling turtle. Several of her papers on the species have already been published, in BNHS Journal, *Oryx*, *Tortuga Gazette*, Hornbill and Hamadryad. We now present a short note on the Kadars, aborigines of the Kerala forest who gave Viji her first cane turtle.

"Trudging up the dreadfully steep ridge which takes you to the brink of the narrow 'Heosemys Valley', I stopped to lean on a tree to wipe off the pouring sweat with an already soaking handkerchief and pulled off another plump leech from my leg. I smiled reassuringly at the two Kadar children who were looking dubiously, as if they expected me to fall on to the rocky path (any moment) and roll downhill. This was my fifth and last trip for the time being, to my study area where the small hill turtle *Heosemys silvatica*, called the 'cane turtle' lived. Incidentally, this was also the last campout with the Kadar tribals who were helping me conduct the study.

My very first acquaintance with the name 'Kadars' was from the book, 'Fauna of British India (Reptiles)' by Malcolm Smith. In my search for the poorly known cane turtle in Kerala, I had referred to information in this book which said that its discoverer D. Henderson, of the Madras Museum, was given two of these turtles in the year 1911, by the 'Kadar' tribals. It was then that I decided that I had to locate the Kadars to find, that is to rediscover the cane turtle or 'Chooral amai' as the tribals called them. The chooral amai had not been reported since 1911.

In June 1982, I visited my first Kadar settlement at a place called Vazhachal 30 km from Chalakudy town in Trichur district. Tribals in this colony have facilities of jobs with the local forest department, a school for their children, free dispensary benefits from a mobile hospital every weekend and government built sandstone houses.

The headman of the tribals called 'Moopan' which means the 'eldest one' was appointed to accompany me as he was the oldest man available to accompany a girl into the forest. Moopan, whose actual name I was never allowed to address, was a dignified man four and half feet tall with a serene face. Rain or shine, we would go out with his big umbrella and his sickle which he used to chop off plants to make way in the jungle. Though we never found a single turtle, he took trouble to teach me every tree of significance and every hill in the vicinity".

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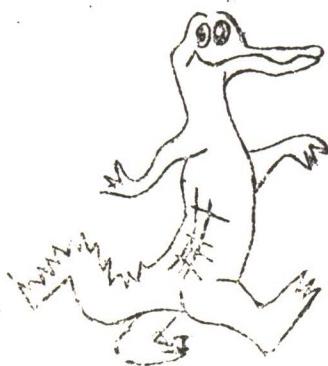
ON THE RIDLEY TRAIL

The Students Sea Turtle Conservation Network (SSTCN) established a hatchery at Nilankarai, Madras on 11th January 1989, for the olive ridley (*Lepidochelys olivacea*) with the permission of the Tamil Nadu State Forest Department and the Government of India Department of Environment. Sixty eight nests (8,625 eggs) were collected between 11th January to 24th February, 1989. A total of 5,725 hatchlings were released by 13th April (hatchling success 66.38%). A detailed report is in preparation for publication in a future issue. The sea turtle hatchery for the 1989-90 season will be established in 1989 at Nilankarai, Madras.

SSTCN also hopes to conduct a variety of conservation awareness programmes apart from the sea turtle programme, which serves as a focal point for conservation and public education in Madras. Interested individuals are invited to contact Kartik Shanker (Secretary) at the address given below:

Students Sea Turtle Conservation Network
A1//14 III Main Road, Besant Nagar
Madras 600090

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AN UNUSUAL RECORD OF CROCODYLUS MORELETII NESTING

Harry Andrews, Curator, Madras Crocodile Bank

In August 1987, the Madras Crocodile Bank acquired ten *Crocodylus moreletii* yearlings from Zoo Atlanta, U.S.A., thanks to Dr. Howard Hunt. These animals were shipped by air and on arrival were measured, sexed and stock coded by scute clipping. They ranged from 95 cms to 114 cms in total length; 48.5 cms to 60.0 cms snout to vent; and 3070 gms to 4620 gms in weight. On sexing the yearlings, nine of them were found to be females and one was a male.

The initial rearing enclosure for the crocodiles was a circular pen 6.5 M in diameter, with a 1.2 M high stone wall with a pond

measuring 4 M long, 2.5 M wide and 2 M deep. The vegetation in the enclosure consisted of grasses, shrubs and trees. These yearling crocodiles were fed daily, the feed being mainly rats, fish, mole crabs, beef bones and frogs, at an approximate rate of 150 gms to 200 gms per animal.

In July 1988, these animals were transferred to a larger enclosure 15 M long x 12 M wide, containing a larger pond 8 M long x 6 M wide x 2.5 M maximum depth. The enclosure is shaded by trees and the undergrowth consists mainly of grasses with a steep sand slope on one side and rocks on the edges of the pond. By this time the animals had grown and ranged from 120 cms to 136 cms in total length, 57 cm to 69 cms snout to vent; and 7000 to 11000 gms in weight.

In early June this year, the keeper observed that one of the females did not come up to feed during feeding time every day, and on the 29th June in searching for the animal, a mound nest was found toward the back of the enclosure, behind a dense growth of tall grasses and a rock pile. As the nest was very close to the pond, the female lay in the pond between the rocks guarding her nest. On approaching the nest, the female charged forward and lay by her nest. Being a small female, she was easily warded off with a light pole.

The nest situated at a distance of 2 M from the pond had a diameter of about 114 cms and height 46 cms. The nest substrate was mainly composed of dry leaf-litter, grasses and about 60% sand. The first layer of eggs were found at a depth of 36 cms from the top of the nest and the last layer at a depth of 51.5 cms.

Nest temperatures ranged from 30.6°C at the top of the nest, 30.4°C inside of first layer, 30.4°C to 30.6°C in the rest of the layer and 31.2°C at the bottom of nest. The low temperature at the top of nest may have been due to the 1 cm rainfall the previous night. Temperatures were recorded with a digital thermometer (omega).

The eggs numbering 21 totally were of an unusual size and weight. These miniature eggs, even though infertile, were well formed and calcified. The eggs had no bands, and are estimated to have been in the nest for at least 7 days.

Egg details

	length (mm)	width (mm)	weight (gms)
Average	54.8	32.7	34.6
Range	50 - 60.1	30.7- 34.35	26.4 - 40.8

One egg shell was weighed after the egg contents was removed, and the shell washed, and dried for 2 hours in a cool room. The shell weighed 3.8 gms.

This female was last measured on 20th February 1989, and measured 156 cm in total length, and 83 cms snout to vent. Hatched in

1986, she is estimated to be 2 years and 9-10 months old (as the exact month of hatching is not known).

From our past experience in the successful breeding of other species of crocodilians and caiman, we have found that optimum growth rates have been achieved when crocodiles and caiman are given the right basic conditions, (i.e. sufficient land area, water, shade and proper feed regimes) in turn inducing early breeding.

In *C. palustris* we have found that females start breeding when they are 1.5 to 1.6 M in length, and *Caiman crocodylus crocodylus* when they reach 1.0 to 1.3 m in length. Although females of these sizes tend to lay smaller clutches, the eggs are usually fertile. In the case of the *C. moreletii* female, she is the youngest breeding female that has been recorded.

One of the on going studies here at the Madras Crocodile Bank is to determine whether size or age is the critical factor that initiates breeding in females, and as we have various species, there is scope for comparison.

GAVIALIS GANGETICUS NEST AT THE MADRAS CROCODILE BANK

Harry Andrews, Curator, Madras Crocodile Bank

Since 1975, the Madras Crocodile Bank had acquired 15 Gharials (*Gavialis gangeticus*), 12 females (2 of which were yearlings acquired in 1986) and 3 males. The adult females range from 3 to 4 M in length, aging from 10 to 15 years old. The males, two of which are over 4 metres in length have well-developed gharae on their snouts. The two juvenile females now measure 1.6 and 1.85 metres. These animals are fed daily with a combination of dead sea fish and live freshwater fish.

The gharials are housed in a large enclosure measuring 42 M in length and 25 M in width with a natural pond 30 M in length, 8 M in width and 2-1/2 M deep. The enclosure is landscaped with evergreen trees and grasses, with a steep sand slope on one side of the pond.

On 20th April 1989 at 05.30 hours, the long awaited event finally took place. A female was noticed laying eggs on the steep sand bank. The night observer, in his excitement to make sure he was seeing right, shone his flashlight on the female, startling her immediately and she turned and dashed into the pond. After waiting for 2 hours with no avail to see if the female would surface from the water to complete her nesting, the nest was inspected and two eggs were found. On candling the eggs, both were found to be viable, measuring 87.4 and 87.2 mm in length; 56.75 and 55.55 mm in width; and weighed 159.2 and 152.4 gm each, respectively. This female measured 3.5 metres in total length.

The following day, another female nested at 2300 hours. This female nested on the sand bank 3 metres from the former female's nest site. She laid 11 eggs totally, 7 of which were found to be fertile, 3 infertile and one was found damaged in the nest.

The third nest was found accidentally on the morning of 9th May. When approaching the sand bank a female charged up from the pond. Later by probing into the sand with a thin stick a nest was discovered containing 19 eggs, of which 15 eggs were banded. These eggs were estimated to be at least 6-7 weeks old and development had stopped in all the eggs. This factor was obvious since the ground temperatures ranged from 33.9°C to 35°C between the layers of eggs (the temperature being above the viable temperatures for crocodile eggs).

The nine viable eggs from the 1st and 2nd clutch were incubated in sand and temperatures maintained between 31°C and 32°C. All nine eggs hatched after 68 days. The hatchlings were healthy and active, ranging from 353 to 366 mm in total length, 172 to 176 mm snout to vent, and 335 - 381 gms in weight. These hatchlings are being reared in a nursery pen 3 M x 3 M, containing a pond 2 M x 2 M x 50 cms deep, and are being fed on small live fish, tadpoles and shrimps.

The adult female gharials have dug several trial nests over the years, but have never nested, except for one 38 year old female that laid uncalcified eggs for two years consecutively, and died in June this year. This female had extruded her oviduct while attempting to nest last year (see Hamadryad Vol.13.2 pp 20).

This year the gharial pond was shaded with palm leaves on poles. Temperatures here at the Croc Bank range from 20°C to 28°C during the cooler months and from 30°C to 41°C during the summer months. The temperatures recorded here during the gharial nesting season, were almost 10°C higher than the gharial's original habitat. It is not known if the reduction in temperature by shading of the pond induced breeding, or whether it was the size class of the females, as these animals are from a group of similar sized animals and probably from the same clutch that have started to nest in northern India in a Government captive breeding facility, from where our animals have originated.

We hope to have at least 6-7 nests next season and do a study on the breeding biology of this species which has never been done before.

* * * * *

The following is a letter received from Johan Marais, informing us of the setting up of a Crocodilian Study Group in South Africa.

The Crocodilian Study Group of Southern Africa has been established as a bureau to present first-hand information on crocodilians, crocodile research and crocodile production to its members.

The objectives of the study group are to:

- create a forum through which participants can be kept informed of the latest research findings and developments pertaining to all aspects regarding crocodilians in the world.
- create a forum for producers and researchers to exchange ideas and identify information gaps which could either be followed up by liaising with producers abroad, literature studies or research projects, to the benefit of the industry.

Information will be disseminated to all participants by means of a newsletter which will be compiled on a regular basis when relevant and appropriate information comes to the attention of the co-ordinators.

Regular updates on the most recent literature and developments in the world of crocodilians which may be of interest to the crocodile producer and/or research, will be possible due to the close liaison this study group has with the Crocodile Specialist Group of the Species Survival Commission, the American Alligator Farmers Association and other bodies involved with crocodilians. Apart from this, we have access to the CROCLIT database.

Please note: The Crocodilian Study Group of Southern Africa is not a society or association for producers or scientists, nor is it associated with such a society or association. It is a group of crocodilian enthusiasts interested in collaborating to their mutual benefit.

The co-ordinators of the study group are:

Mr. Johan Marais
P.O. Box 414
Botha's Hill 3660

Prof. G.A. Smith
Department of Animal Science
University of Pretoria
Pretoria 0001

Participation in the study group will be open to all progressive producers and crocodilian enthusiasts.

JOHAN MARAIS

* * * * *



INDIAN MONITOR LIZARDS: A REVIEW OF HUMAN UTILISATION PATTERNS

Indraneil Das, Biologist, Madras Crocodile Bank

Popular herb literature is replete with anecdotes concerning the human utilisation of monitor lizards in India. Here, I have attempted to review such literature, with data from often unconsulted sources, that provide information on the utilisation of these large predatory lizards by man for food, for manufacture of luxury items or traditional medicines.

Prehistoric records

Upper Palaeolithic cave paintings at the Bhimbetka Rock Shelters, near Bhopal, central India, discovered in 1957, feature many of the local animals, including monitors. Since all the species figured are thought to have been hunted by early man for food, it provides perhaps the first record of human utilisation of monitors, over 10,000 years ago. An excellent documentation of these paintings, with brief remarks on 'lizards' can be found in Wakankar and Brooks (1976). Similar paintings, illustrated by Carr (1963), of monitor lizard and other animals, are to be found in certain caves in Australia, executed by the aborigines. It is thought that by painting and repainting their prey species on the cave walls, early man hoped of the continued survival of their prey species.

Internal commercialisation

Few parts of a monitor lizard are thrown away : eggs are considered a delicacy and the entire animal is also eaten (Murthy 1978, 1988, Anon. 1980); oil from fat is used in the treatment of failing eye sight (Murthy 1988) and in cooking (Aufenberg 1986); the skin is highly prized and used in the manufacture of various leather goods, including drums (Whitaker and Whitaker 1980) and scabbards for kukris (Das 1988).

Unani, the Greco-Arabian system of medicine which is part of the Indian *materia-medica* recommends the use of various body parts of monitors to cure numerous ailments. The flesh of freshly-killed monitors causes healing in case of thorn pricks and bites of poisonous animals (Hussain 1771, Khan 1911, Vohora and Khan 1979), besides curing tuberculosis, skin problems and sexual

debility (Nadkarni 1954, Vohora and Khan 1979). Monitor fat is an aphrodisiac and the excretion used in the treatment of eye and skin diseases (Hussain 1771, Khan 1911, Vohora and Khan 1979).

Travelling hakims or country doctors who visit the plains during the winter exhibit a variety of drugs and tonics derived from animal sources. The desert monitor (*Varanus griseus*) is the commonest varanid in a hakim's shop, though the land (*Varanus bengalensis*) and yellow (*Varanus flavescens*) monitors may occasionally turn up. Chakraborty and Chakraborty (1987) reported on collection of *V. flavescens* by locals at Birbhum District, West Bengal, for sale to hakims.

An important manufacturer of leather, a fairly significant number of monitors are believed to be in India's the luxury leather trade. Several leather shops at Calcutta's New Market, display products made from these reptiles (Das 1988a). A row of shops in the same market, run by Chinese, offer custom-made lizard shoes to their wealthy clients. The flesh of monitors, until recently, was sold in the market of Thakurpukur, south of Calcutta, and the buyers were presumably low-caste Hindus.

Thus, a significant drain on wild populations of monitors, as a result of internal commercialisation is suspected.

As population and status data are particularly difficult to get, it is hardly surprising that almost no information on past populations exist. The naturalist Senapati (circa 1980) wrote, 'Every hedge in every village in Puri district used to have a godhi as monitor lizards are called in Oriya. In 1903, during my childhood, at Garidipanchan, I would come across the godhi four times a day. But now I have been living in the Puri district for the last twenty years and have seen only one, which was chased by dogs into my house at Bhubaneswar'.

Senapati continues, 'Godhi skin is used to make ladies handbags, and this has resulted in its extermination'.

Elsewhere, the group is thought to have suffered as badly. Dharmakumarsinhji (1978), an experienced naturalist, commented on the decrease of monitor lizards in Gujarat's Kathiawar region, as did Daniel (1970) of the 'once common lizard', both authors presumably referring to *Varanus bengalensis*.

The Indian Wildlife (Protection) Act of 1972 gives legal protection to all the four species of monitors found in the country:

SCHEDULE I : *Varanus flavescens*

SCHEDULE II : *V. griseus*, *V. salvator* and *V. bengalensis*

Foreign Trade

Though the export of reptiles from India has been banned since 1979, large numbers of skins of snakes and monitors are believed to be involved in the clandestine trade. The Convention on International Trade on Endangered Species of Wild Flora and Fauna

(CITES) lists *Varanus flavescens*, *V. griseus* and *V. bengalensis* under Appendix - I, indicating these may not be traded in by countries that have ratified CITES, while *V. salvator* is in Appendix -II, and can be exported/imported by these countries, provided shipments are accompanied by appropriate papers from the country of origin.

Brautigam (1986) listed 120 unspecified items manufactured from *Varanus salvator* skins, which were reportedly exported from India, via Mexico, to the U.S.A. in 1983. Among the signatories of CITES, Thailand has entered reservation on *V. bengalensis* and Japan on *V. bengalensis*, *V. flavescens* and *V. salvator* (Gaski 1988).

In 1985, at the 5th meeting of CITES in Buenos Aires, Argentina, Bangladesh's proposal to transfer both *Varanus flavescens* and *V. bengalensis* from CITES Appendix-I to Appendix -II (which would have allowed the country to legally export skins of these 2 species) was not voted, as no delegates from the country were present (Barzado and Inskip 1985). Large numbers of varanid skin's are known to be in the illegal reptile skin trade from Bangladesh, and at least a part of this originate from the Indian state of West Bengal (Das 1988a).

Inskip (1981) reported that despite laws protecting monitors, large numbers are hunted for the leather trade in India. The same report mentioned that in December, 1979, dealers in Calcutta held over 3 million lizard skins in their stock. Over 50% of these were the 'oval-grained lizard', *Varanus flavescens*, with an almost equal number of 'Agra lizard' and 'Bengal lizard', both presumably because of its present restricted range, is the rarest of the monitors in the stock of exotic leather merchants.

This note is a side-study of a consultancy done for the World (IUCN) Conservation Monitoring Centre and CITES. I thank Drs. Brian Groombridge and Richard Luxmore, Senior Scientists at the IUCN/CMC for giving me this opportunity.

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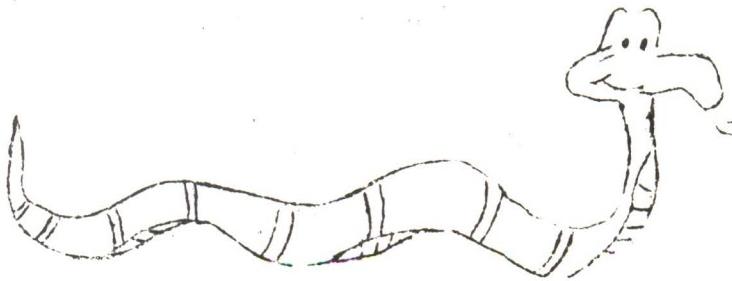
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CORRIGENDUM

Hamadryad 13(2):4-5 carried the note 'Extension (of) range of the striped coral snake (*Callophis nigriscens*) by Mr. Raju Vyas, Zoo Inspector, Sayaji Baug Zoo, Vadodara. We apologise for the omission of the author's name and affiliation in the said paper.

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A STATISTICAL REPORT ON THE IRULA SNAKE CATCHER'S

CO-OPERATIVE SOCIETY

S. Dravadamani, Manager
Irula Snake Catcher's Co-operative Society

The Irula tribals have been catching snakes since December 1982 for their Co-operative Society. The snakes are caught for venom extraction for the production of anti-venom serum, which is supplied to various Government laboratories and research institutes in India, that produce the anti-venom serum.

The snakes caught by the Irula members are kept for a month at the Co-operative. They are first measured, weighed, sexed, scale clipped for individual identification and secured in mud pots, which have proved to be very advantageous for the quick and easy handling of snakes and also helps to keep them cool. These snakes are milked once a week for four weeks at a time and then released back into the wild. Table 1 shows the number of snakes caught and the quantity of venom produced for the last 7 years.

TABLE 1

Species	Number caught	Total Venom Produced (after desiccation)
Common cobra <i>Naja naja</i>	1,724	583.239 gms
Common krait <i>Bungarus caeruleus</i>	4,999	134.324 gms
Russell's viper <i>Vipera russelii</i>	948	211.582 gms
Saw-scaled viper <i>Echis carinatus</i>	44,262	254.862 gms
Total	51,933	1,184.007 gms

Total number of Irula snake catchers involved : 326

At the start of the project, the mortality rate for snakes was 1.3%, mainly during the summer months when the temperatures are between 38°C to 41°C, but this has been overcome by sprinkling water and the use of a desert cooler, to keep the snake pit cool.

Over the years the Co-operative personnel have also been collecting valuable scientific data for the four species mentioned above, such as scat samples to determine their food preferences, sex ratios, size classes and area densities of individual species. It has also been found that a common krait produces 20 mg of venom after four extractions, while the saw-scaled viper produces 5 mg of venom. Table II shows the quantity of venom extracted from October 1988 to June 1989.

TABLE II

Month/Year	Common krait Quantity of venom extracted in gms.	Saw-scaled viper Quantity of venom extracted in gms.
October 1988	Nil	8.215
November 1988	1.480	49.745
December 1988	3.240	60.619
January 1989	2.080	19.775
February 1989	1.700	14.175
March 1989	2.960	2.160
April 1989	6.115	0.970
May 1989	3.491	0.100
June 1989	3.120	0.835
Total	24.186	156.594
Total No. of kraits	:	981
Total No. of saw-scaled vipers :	19,950	

Snakes are difficult to find during the summer months. Table III shows the number of saw-scaled vipers caught during the period October 1988 to June 1989.

TABLE III

Month/Year	Number of Saw-scaled vipers caught
October 1988	2,068
November 1988	10,042
December 1988	1,873
January 1989	3,848
February 1989	708
March 1989	1,095
April 1989	37
May 1989	12
June 1989	267
Total	19,950 Nos.

The Co-operative is now in the process of renovating its existing laboratory and turning it into a fully-equipped airconditioned lab, complete with a lyophilizer for freeze drying the venom, and generator for uninterrupted power supply. This is mainly due to a grant awarded by NORAD (Royal Norwegian Agency Development Corporation).

* * * * *

SNAKEBITE CASE RECORD

S. Dravidamani, Manager, Irula Cooperative Society

Name	:	C. Rajeswari
Sex and Age	:	Female, 20 years
Location of bite	:	left leg, below knee
No. of fang marks	:	Marks not distinctive
Species	:	Common krait (<i>Bungarus caeruleus</i>)
Symptoms	✓	Acute chest and body pain, and respiratory distress.

On the night of 15.6.89 at approximately 2100 hours, C. Rajeswari was bitten on her leg while asleep on the floor of her hut. She was startled from her sleep on being bitten, and awoke the inmates of her house to inform them of the bite. She complained of pain in her left leg, and was given herbal treatment for a scorpion bite, after which the pain became more severe. At around 0400 hours, an Irula doctor arrived and on inspecting the patient, informed the victim's uncle that it was a case of snakebite. A thorough search was conducted and thirty minutes later a common krait was found under the patient's mattress.

The patient was immediately given tribal herbal treatment for krait bite and at 0600 hours, when transport was available, was taken 60 kms to a Government hospital where she was immediately given anti-venom serum. Unfortunately, the patient succumbed to the bite at 0800 hours. Her death was thus due to the considerable delay in getting her to the hospital for administering anti-venom serum.

* * * * *

SNAKEBITE CASES AT BARUIPUR, SOUTH 24 PARGANAS DISTRICT,

----- WEST BENGAL TREATED BY 'MANGTA' MEDICINE MEN -----

B.K. Saha, 'Shantiniketan' Rishi Bankimnagar,
Baruipur 743 302, West Bengal

In December 1988 issue of 'Hamadryad' I have gone through an article on snakebite cases in Chingleput District, Tamil Nadu treated by Irula tribal medicine men. Herein I present data from Baruipur, West Bengal. Like Irula snake catchers, at Baruipur, there is a community of 700 snake catchers, which include men locally known as 'Mangta' (i.e. Sapure) who use herbal medicine to cure snakebite victims. For the last ten years snakebite cases were treated by these medicine-men, three of them unsuccessfully, which resulted in the death of the patient. The Table given overleaf, provides more details of these cases.

It may be noted that Hasem Sapure had been bitten thrice and each time cured by herbal medicine. Bite marks are to be seen now on his ring, fore and little finger, and his fore-finger has been deformed as a result of the bite. Deformation of hand has also occurred in the case of Muna Sapure who has lost its use.

Patient	Sex/ Age	Date / Time of bite	Date / Time of treatment	Site of bite/No.	Species	Symptoms	Treatment / recovery period
Hasem Sapure	Male 36 years	9.9.79 5 p.m.	Immediately	Left fore finger; one	Cobra	Pain, swelling	Herbal medicine for 7 days
Mukshed Sapure	Male 43 years	3.2.79 10.00 a.m.	—do—	Right hand; two	—do—	—	Expired after treatment
Farman Sapure	Male 56 years	12.7.80 3.00 p.m.	—do—	Left foot; two	—do—	—	Herbal medicine for 15 days
Hasem Sapure	Male 37 years	20.3.81 10.30 a.m.	—do—	Left ring finger; two	—do—	—	Herbal medicine for 9 days
Munna Sapure	Male 43 years	20.3.81 10.00 a.m.	—do—	Left hand; Russell's viper two	—do—	—	Herbal medicine for 2 months.
Hasem Sapure	Male 38 years	17.4.82 2.00 p.m.	—do—	Left little Cobra finger; one	—do—	—	Herbal medicine for 3 days
Nani Sapure	Male 45 years	2.5.82 11.00 a.m.	—do—	Left foot; two	—do—	—	Expired after treatment
Mantu Sapure	Male 59 years	2.5.83 4.00 p.m.	—do—	Common krait two	—do—	—	Herbal medicine for 3 days
Kalachand Sapure	Male 42 years	7.4.84 10.00 a.m.	—do—	Right hand; Cobra two	—do—	—	Herbal medicine for 10 days.
Ayed Sapure	Male 52 years	9.5.88 2.30 p.m.	—do—	Right hand; Cobra two	—do—	—	Herbal medicine for 4 days

POISONOUS SNAKEBITE CASES IN RAIDIGHI RURAL HOSPITAL, WEST BENGAL, FROM 1982 TO 1988

S.G. Saha, Medical Officer, Raidighi Rural Hospital, P.O. Raidighi
 District 24 - Parmanas (South), West Bengal

Year	No. of males	No. of females	No. bitten	Total	Patients brought dead			No. of common krait bites	No. of unidentifi ed bites	No. of patients cured	No. of patients expired	No. of patients after treatment	Remarks
					No. of cobra bites	No. of krait bites	No. of bites						
1982	3	4	7	11	4	2	1	2	1	1	3	3	
1983	6	5	11	11	5	8	3	—	—	6	—	6	
1984	13	4	17	17	3	8	9	—	—	14	—	14	
1985	4	10	14	14	1	5	5	5	4	12	1	12	
1986	7	6	13	13	3	5	7	1	1	7	3	7	
1987	1	4	5	5	—	—	—	3	2	5	—	5	
1988	12	7	19	19	—	4	6	6	9	13	—	13	Prognosis of one case not known
TOTAL	46	40	86	86	13	34	35	17	60	12	(Mortality rate 13.9%)	12	

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Indraneil Das, Biologist, Madras Crocodile Bank

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